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G87-836 Coldframes and Hotbeds

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Coldframes and Hotbeds

Coldframes and hotbeds can help the home gardener in many ways. This NebGuide explains uses, construction, and management.

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Hotbeds and coldframes are mini-greenhouses in that both use solar energy and sunlight. Coldframes and hotbeds can help the home gardener start, grow and maintain plant material and the commercial grower propagate and display plant material.

The main difference between hotbeds and coldframes is that hotbeds have a supplemental heat source. This supplemental heat source may be organic, such as manure, or non-organic, such as an electric heating cable. Construction can be simple and inexpensive or quite sophisticated. Hotbed/coldframe size can vary.

Uses

Coldframes and hotbeds can be used to:

1. Increase length of growing season by:
    a. Starting plants earlier.
    b. Providing protection for some plants in the fall.
    c. Overwinter semihardy plants.
    d. Start transplants.
    e. Harden plants.
    f. Dry fruits, vegetables, and flowers.
    g. Force flowering bulbs.
    h. Root cuttings.

i. Stratify seeds, nuts, and acorns.
j. Vernalize plant material.
k. Plant fall vegetables.
l. Store certain vegetables in the fall and winter.

Orientation and Site

Locate the hotbed/coldframe facing south so plants receive full sun most of the day. The site should be convenient for the user, protected from the wind, close to a good supply of water, and located on a well-drained site free from shade. Place electrically heated hotbeds close to a power source.

Construction

The framework for both hotbed and coldframe is similar. Use wood boards, concrete, cement blocks, or bricks to build the frame. Use redwood or cedar for wood frames. If another type of lumber (for example, pine) is used, treat it with a wood preservative such as copper naphthanate. Do not use creosote or pentachlorophenol to treat wood because they are harmful to plants.

Determine the size of the coldframe/hotbed first. Although any reasonable size can be made, a 6' x 6' size is common with 3' x 6' as a minimum. Lengths are usually in multiples of 3'. The width and length also depend on the size of the sash or top panels to be used.

Construction begins with excavation to the desired depth. Hotbeds heated with manure are generally dug 16-24" deep, whereas a coldframe may only be dug 3-4" deep. If stone, brick, or concrete is used, have the footings (at least 3" thick) a few inches below the frost line to avoid winter "heaving".

Most frames are built of wood. Build walls with either 1" or 2" thick lumber. Two-inch lumber may give more strength. Some frames have insulation boards inside to keep the structure warmer.

Place posts of 2 x 4's in the corners to add support to the coldframe/hotbed. Slope the front of the frame lower than the back (1" per foot). As an example, the front of the coldframe may be 8" above the ground and the back 14" if the frame is 6' wide . The boards can be buried from 2-6". Some home gardeners use a portable frame which is not buried so it can be moved or stored. If the sides are not dug into the ground, bank soil around the frame or add insulation boards to conserve heat. A coldframe may also be built as a lean-to against a house or garage. With any type of construction, seal the coldframe/hotbed tightly to prevent heat loss and to prevent rodents from entering. Bank soil around the outside and slope it away from the coldframe/hotbed for good drainage.

The sashes or top panels can be made of glass, plastic film, fiberglass, plexiglass or other translucent material and can be hinged to the frame or left loose. Plastic film is economical but can easily tear. Although more expensive, fiberglass will last many years with proper care. Glass has excellent light transmission qualities but can be dangerous, especially if children play in the area. If 6' x 3' window sashes are used for the top, make the frame 5'8"

long to allow overhang. On a 6' x 6' frame, two 3' x 6' sashes may be used with one sash support arm in the middle of the frame. Screen can be placed over the coldframe to keep rodents and insects out when sashes are removed or vented during warm days.

Hotbeds

A hotbed is a coldframe built over a heat source. Heat sources include fresh manure, electric heating cables, furnaces (oil, coal, or wood), steam, or hot water. Manure and electric heating cables are the most common heat sources.

The advantage of manure as a heat source is its low cost. Disadvantages include cleaning out the used manure each year, odors, the inability to precisely regulate the temperature, and the need to replace the manure each year. Electric heat sources are more expensive to install and operate but can be reused for several years.

Manure or Pit Hotbed

Construction of the manure or pit hotbed begins by excavating about 24" deep. Spread four inches of coarse gravel on the bottom to help drainage and aeration. Then fill the pit with 8-12" of fresh manure mixed 5-10% with straw, tamped evenly and firmly, and moistened with lukewarm water. Cover the manure with 3-4" of good quality loose, weed-free soil. Warm soil permits faster heating and speeds germination. Place a thermometer in the soil. As the manure decomposes, heat is released. When the temperature drops to 75°F, the bed is ready to seed. One word of caution: try to obtain manure, straw, and soil that are free of weed seeds.

Electrically-heated Hotbed

An easier approach to heating a hotbed is to use electric cables. Excavate 6-12" of soil below the frame and put down 4" of carefully leveled, well-drained sand. About 60' of lead or plastic covered electric heating cable is needed for a 6' x 6' bed or about 2' of cable for every square foot of bed. Place the cable on the sand 3-4" from the side of the frame and loop it about 6-8" apart back and forth across the bed. Be sure that the bed is properly wired for safe operation. Attach the cable to a thermostat with a minimum range of 45-90°F and to a 110-volt outlet for use with an automatic control. Never splice electric heating cables. Make sure cables are properly grounded. You may want to consult a licensed electrician to be sure electrical codes are followed and that the proper heating cable and thermostat are used

To help prevent physical damage to the cable from gardening equipment and rodents, place 2" of sand on the cable, cover this sand with hardware cloth, and add another 2" layer of sand on top of the hardware cloth. Plant seeds in containers set on the top layer of sand. Another alternative is to place 6" of good, weed-free soil on top of the hardware cloth and sow seeds directly into the soil.

Management of Hotbeds/Coldframes

Temperatures of 70-75°F are best for germinating seed. Once germination occurs, maintain the temperature in the frame at plant level at 60-65°F for cool season crops and 65-75°F for warm season crops. If temperatures get too high, ventilation is essential. Ventilate on mild days and sunny days. As the season advances, leave the sash off for most of the day and eventually during the night too, to "harden off" the plants.

More frequent watering will be needed as the season progresses. However, overwatering, combined with high or low temperatures, encourages diseases. Avoid high doses of nitrogen fertilizer, and put transplants in the garden at the proper time. Do not start the transplants too early. Most annuals require 30-40 days from seeding time to transplanting (see NebGuide *G76-296, Guide for Planting Vegetables*).

Detailed plans (*U62-06*) for constructing a cold frame are available through the University of Nebraska Agricultural Engineering Department at a cost of $2.50.

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